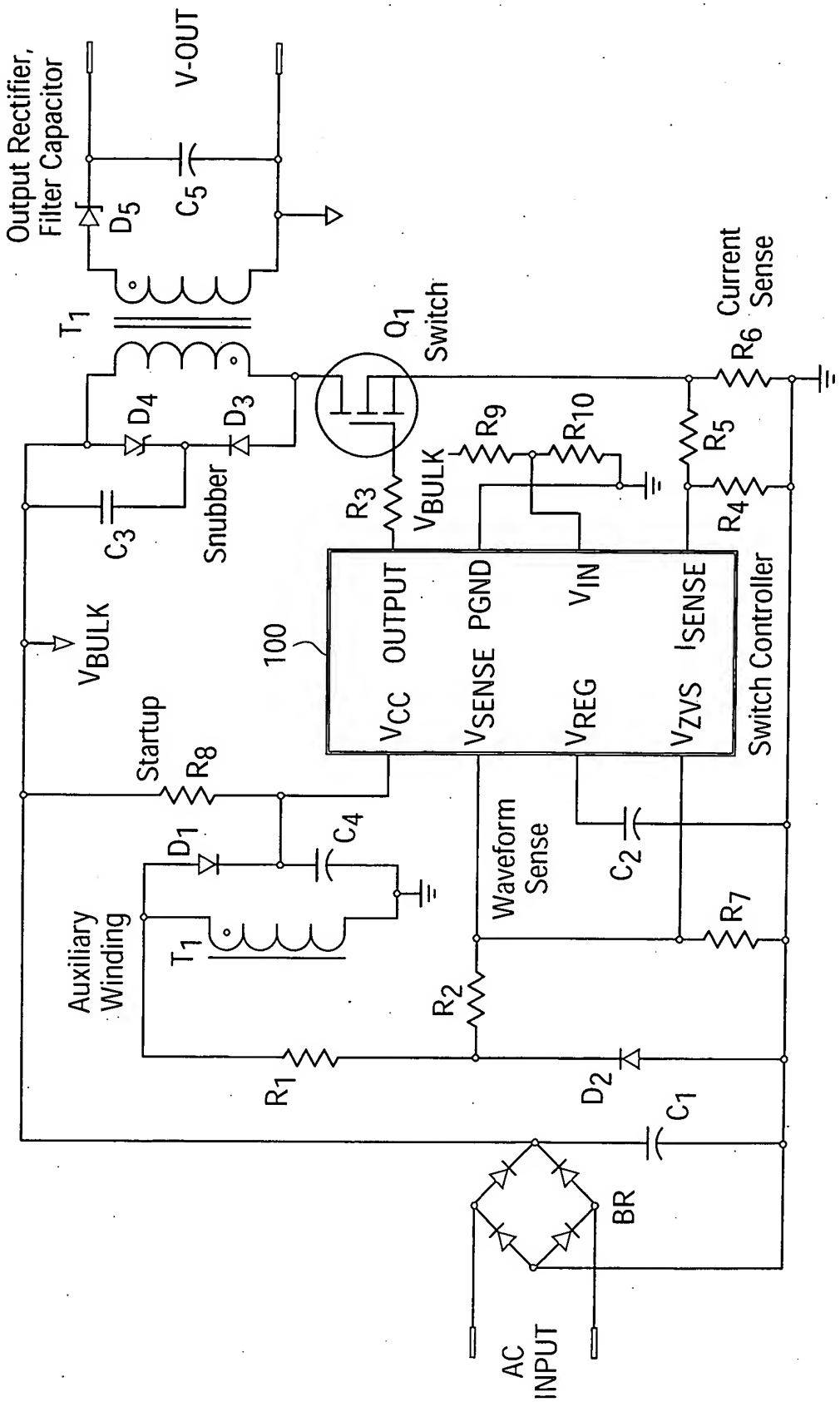
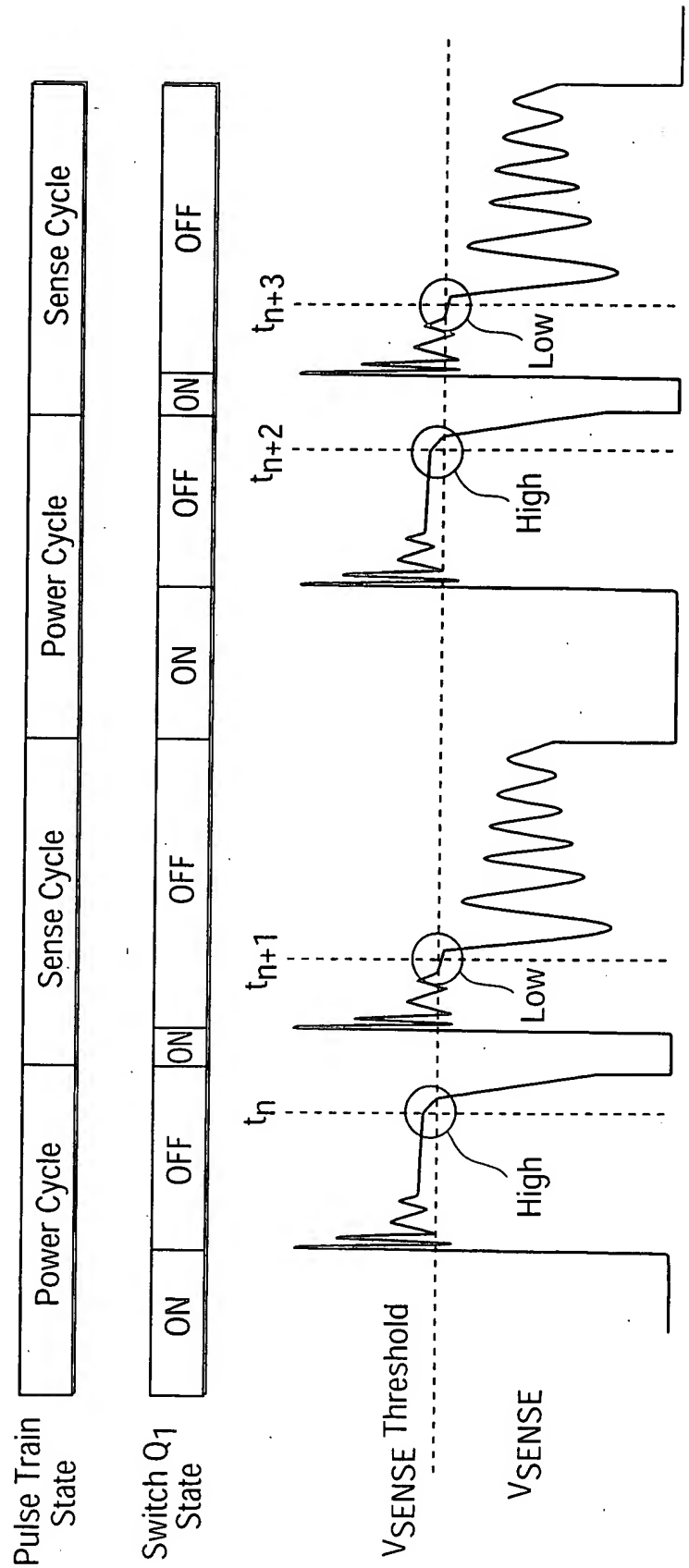


FIG. 1A



V_{SENSE} is measured at a point near the end of the OFF period. This voltage is compared to the V_{SENSE} threshold. If it is higher, the next cycle is a sense cycle. Otherwise, the next cycle is a power cycle.

FIG. 1B

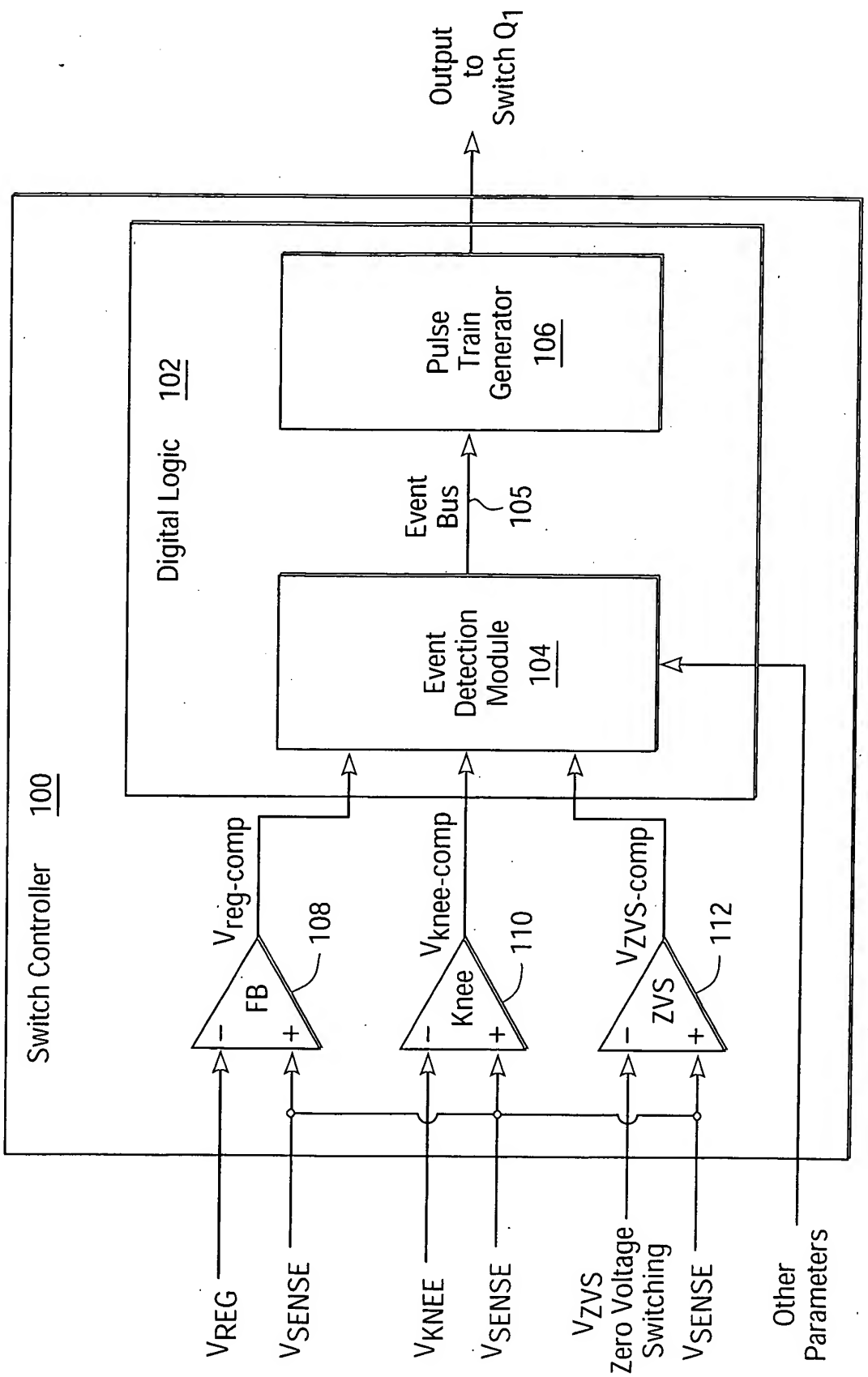

Output to Switch Q_1
Switch Controller 100
Digital Logic 102
Pulse Train Generator 106
Event Bus 105
Event Detection Module 104
$V_{reg\text{-}comp}$
FB
108
$V_{knee\text{-}comp}$
Knee
110
$V_{ZVS\text{-}comp}$
ZVS
112
V_{REG}
V_{SENSE}
V_{KNEE}
V_{SENSE}
V_{ZVS} Zero Voltage Switching
V_{SENSE}
Other Parameters

FIG. 2A

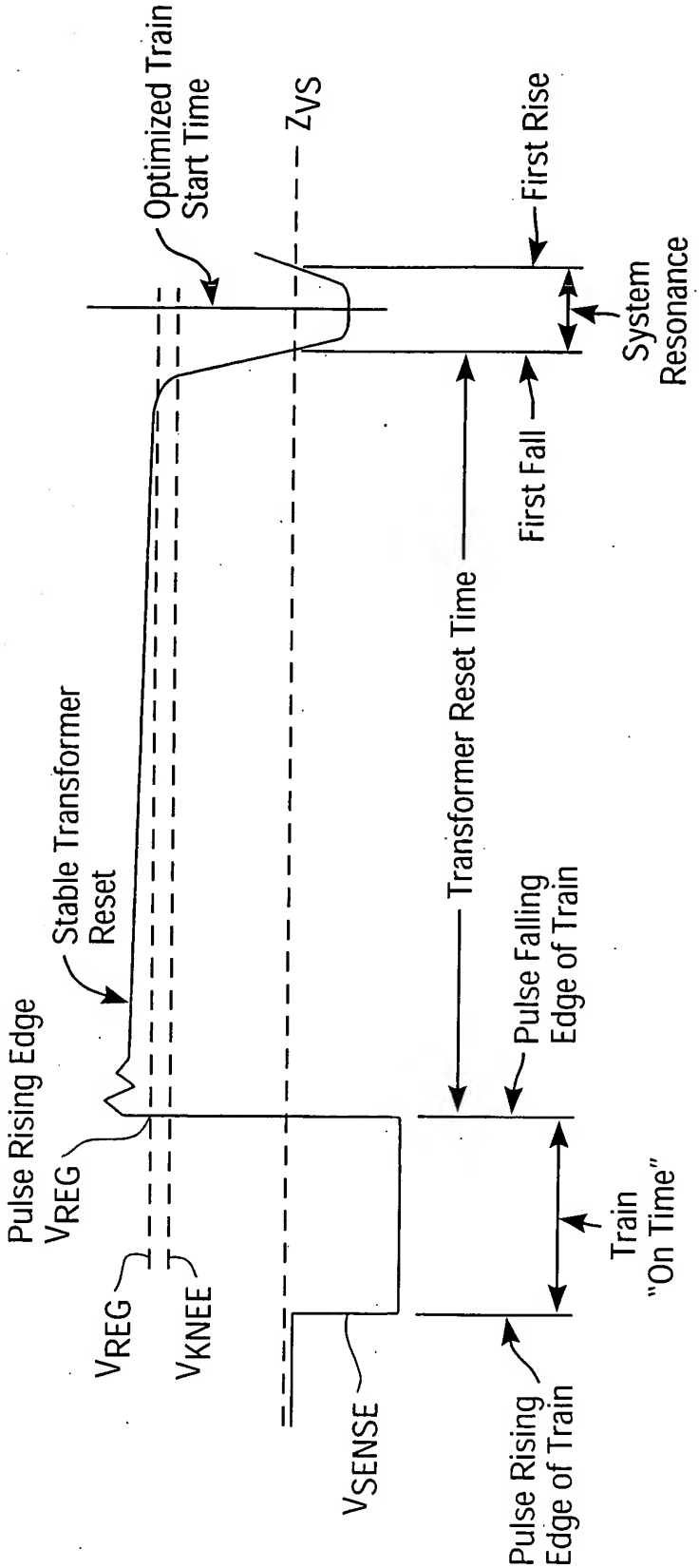

Optimized Train Start Time
Z_{VS}
First Rise
System Resonance
First Fall
Transformer Reset Time
Stable Transformer Reset
Pulse Falling Edge of Train
Pulse Rising Edge
V_{REG}
V_{REG}
V_{KNEE}
V_{SENSE}
Train "On Time"
Pulse Rising Edge of Train

FIG. 2B

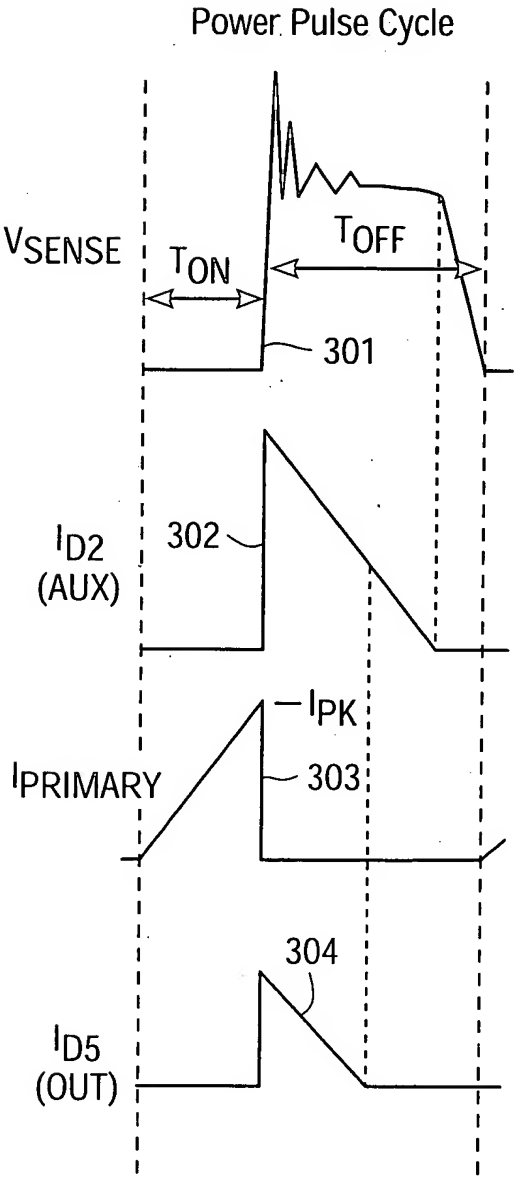

Power Pulse Cycle
VSENSE
TON
TOFF
301
ID2
(AUX)
302
IPRIMARY
IPK
303
304
ID5
(OUT)

FIG. 3A

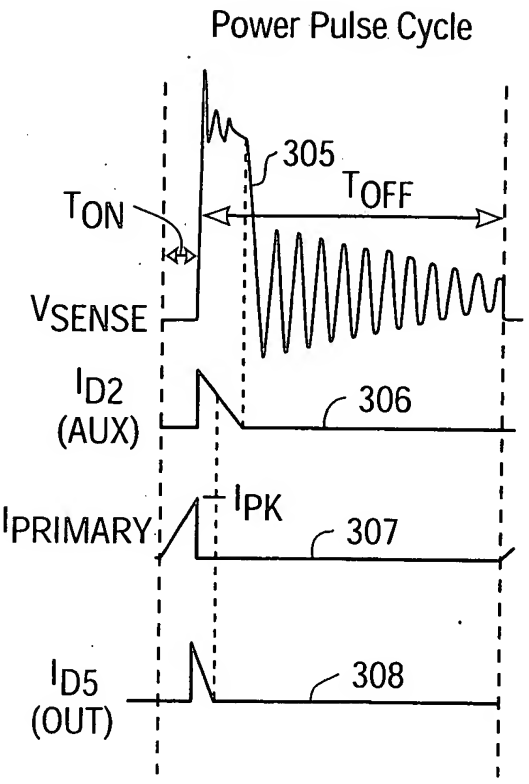

Power Pulse Cycle
305
TON
TOFF
VSENSE
ID2
(AUX)
306
IPRIMARY
IPK
307
ID5
(OUT)
308

FIG. 3B

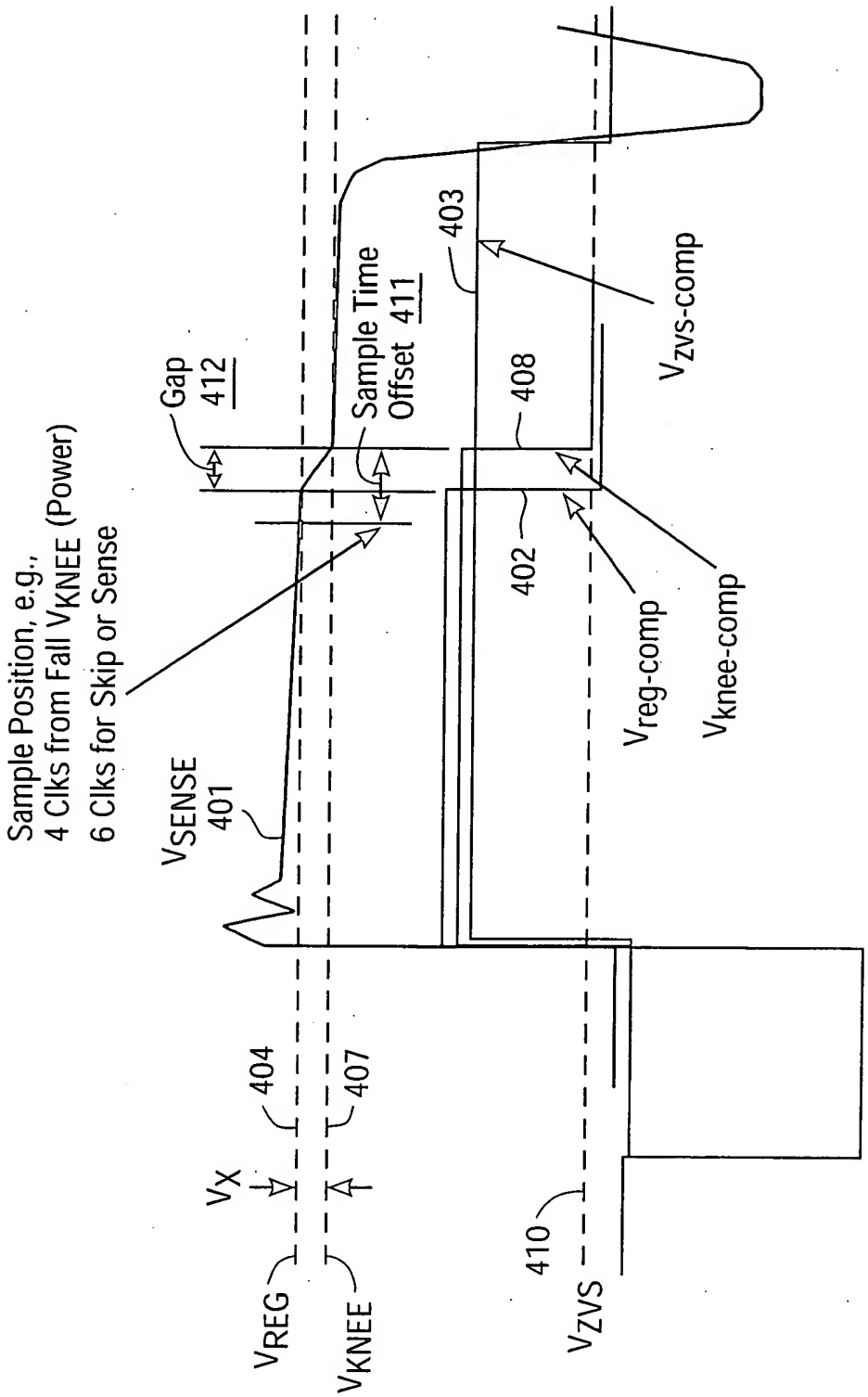

Sample Position, e.g.,
4 Clks from Fall VKNEE (Power)
6 Clks for Skip or Sense
VSENSE
401
Gap
412
Sample Time
Offset 411
403
408
402
VZVS-comp
Vreg-comp
Vknee-comp
VX
404
407
VREG
VKNEE
410
VZVS

FIG. 4

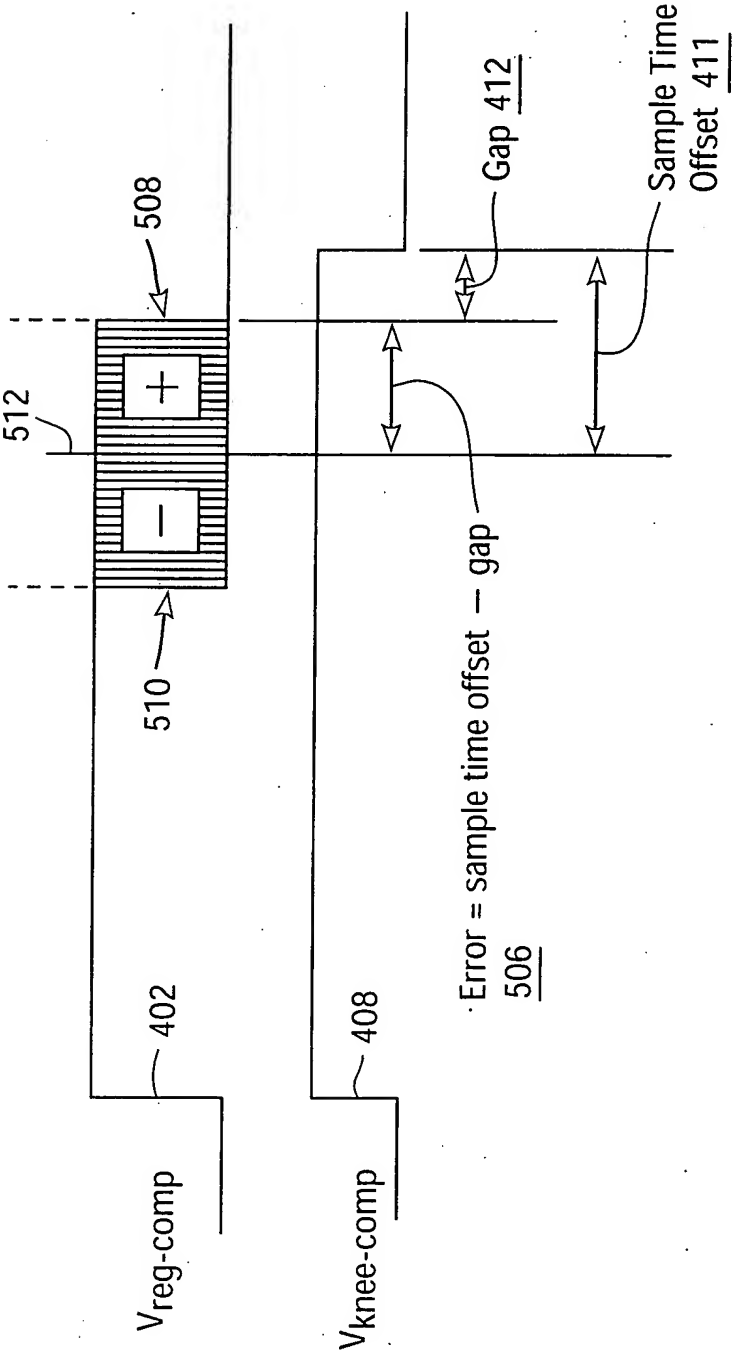

508
512
510
+
−
Gap 412
Sample Time Offset 411
Error = sample time offset − gap
506
402
408
$V_{reg\text{-}comp}$
$V_{knee\text{-}comp}$

FIG. 5A

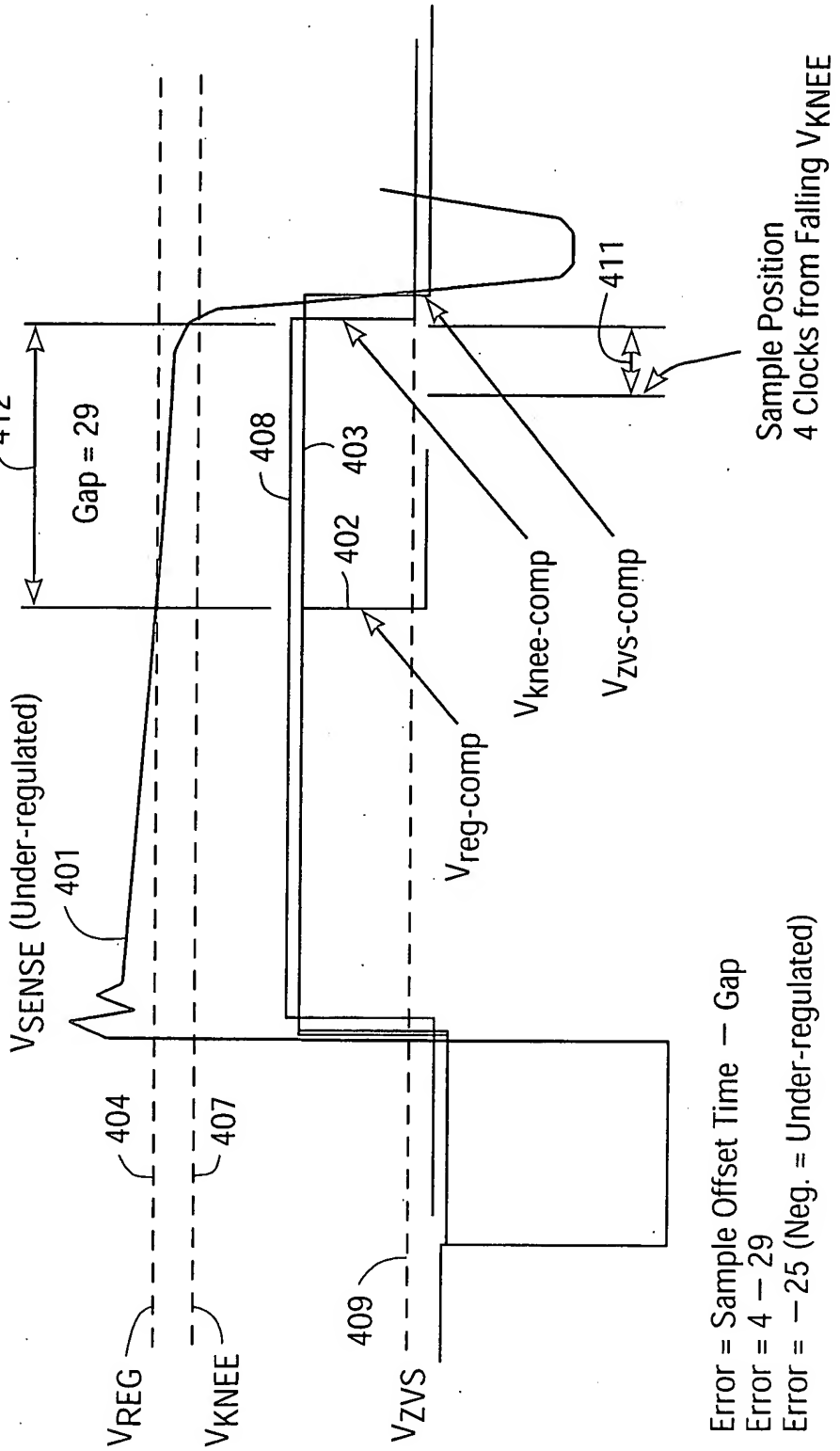

412
Gap = 29
408
403
402
411
Sample Position
4 Clocks from Falling V_{KNEE}
$V_{knee-comp}$
$V_{zvs-comp}$
$V_{reg-comp}$
V_{SENSE} (Under-regulated)
401
404
407
409
V_{REG}
V_{KNEE}
V_{ZVS}
Error = Sample Offset Time − Gap
Error = 4 − 29
Error = −25 (Neg. = Under-regulated)

FIG. 5B

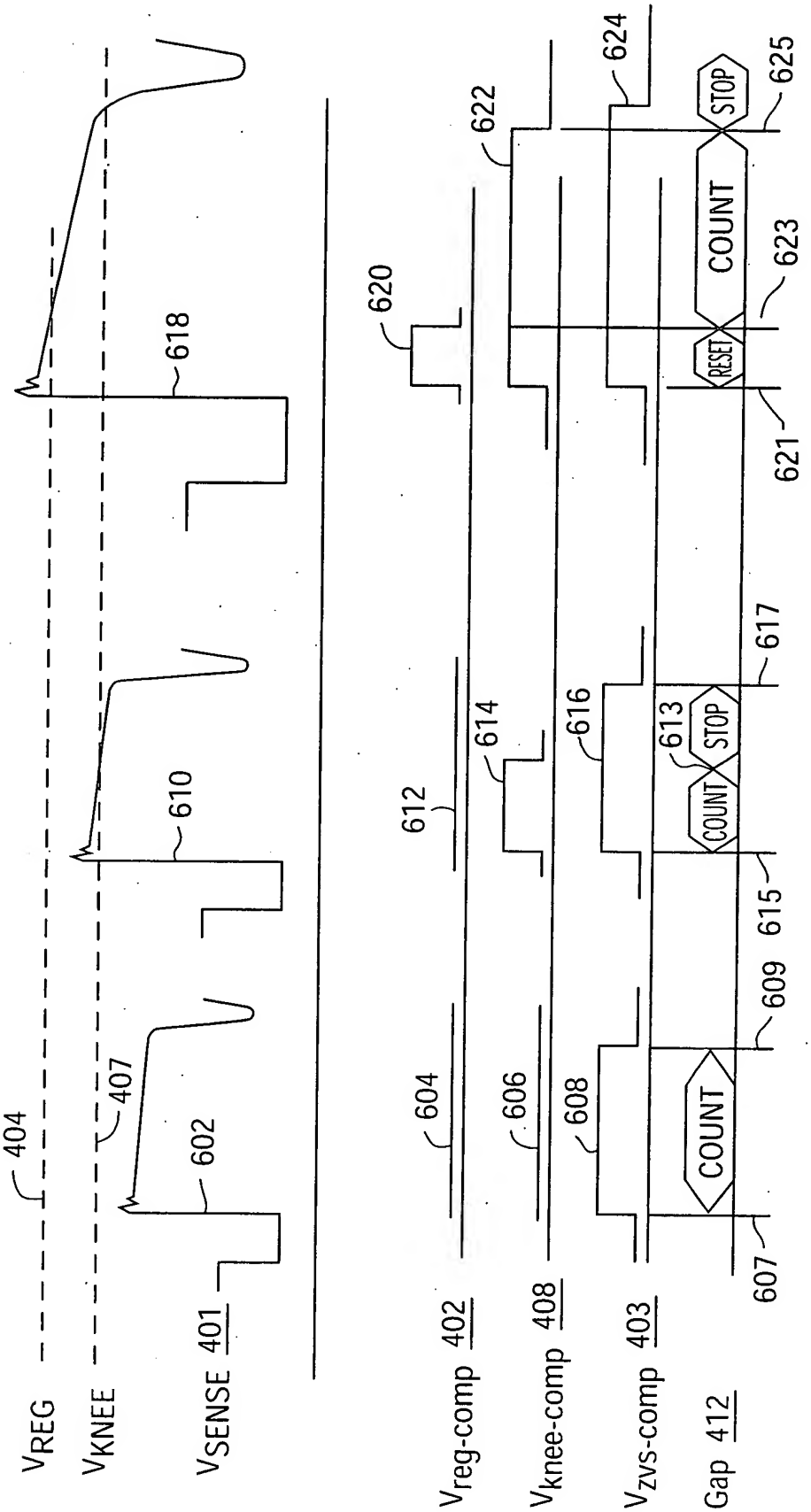

V_{REG}
V_{KNEE}
V_{SENSE} 401
$V_{reg\text{-}comp}$ 402
$V_{knee\text{-}comp}$ 408
$V_{zvs\text{-}comp}$ 403
Gap 412
404
407
602
610
618
604
606
608
609
612
614
615
616
617
620
621
622
623
624
625
COUNT
STOP
RESET

FIG. 6

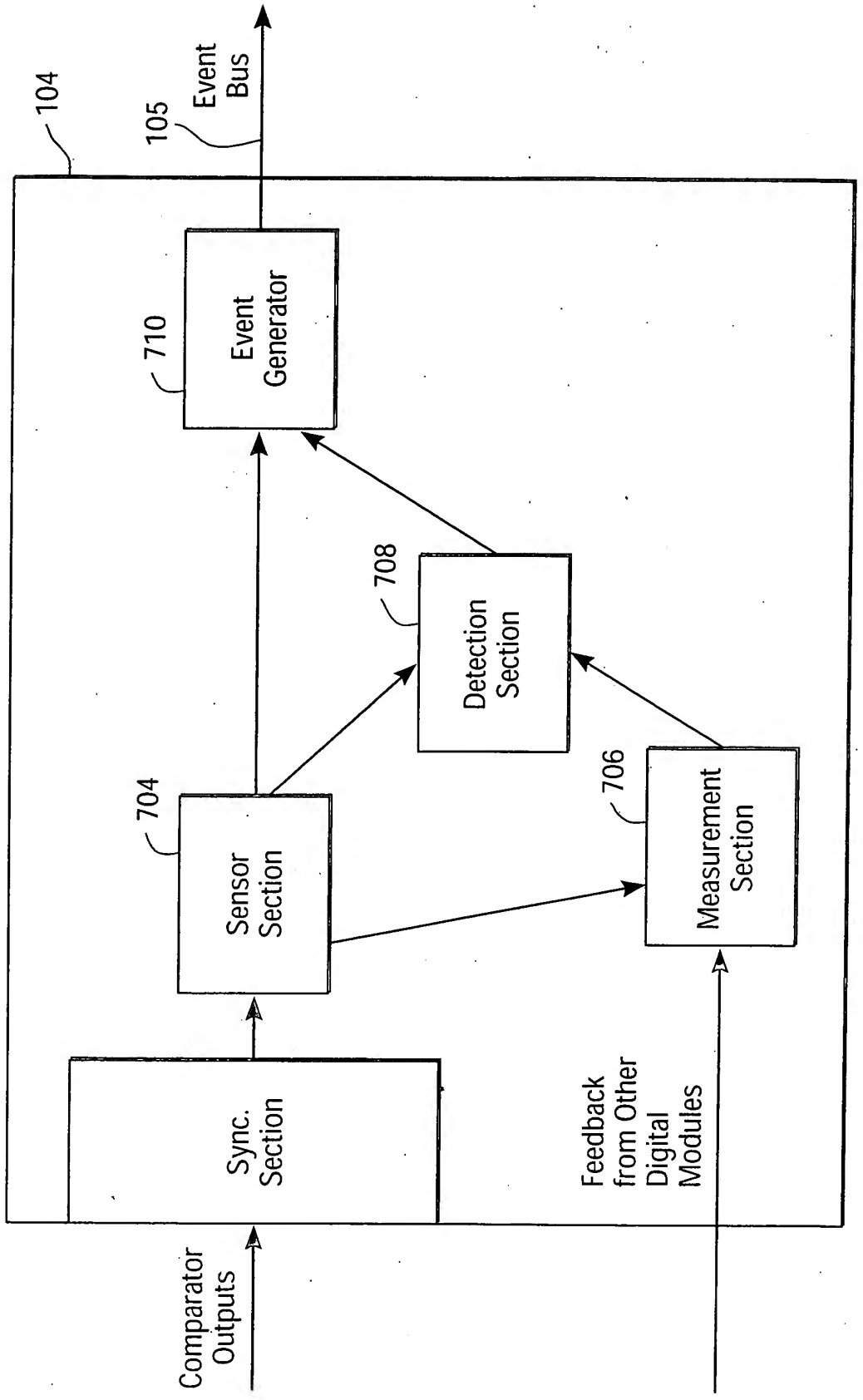

104
105
Event Bus
710
Event Generator
708
Detection Section
704
Sensor Section
706
Measurement Section
Sync. Section
Comparator Outputs
Feedback from Other Digital Modules

FIG. 7